OFFICE OF THE UNDER SECRETARY OF DEFENSE

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ACQUISITION,
TECHNOLOGY
AND LOGISTICS

November 7, 2001

MEMORANDUM FOR U.S. MISSION TO NATO, ARMAMENTS COOPERATION DIVISION
BOX 200, PSC 81, APO AE 09724

SUBJECT: Draft STANAG 4325 (EDITION 2) – "AIR-LAUNCHED MUNITIONS SAFETY AND SUITABILITY FOR SERVICE EVALUATION "

Reference document, AC/310-D/181, 14 August 2000, SAB.

The U.S. Armed Forces ratifies the referenced agreement with comment.

Ratification and implementation details are as follows:

	IMPLEMENTATION					
	Forecast Date			Actual Date		
RATIFICATION REFERENCE	NAVY	ARMY	AIR FORCE	NAVY	ARMY	AIR FORCE
Memo, OUSD(AT&LT) DATED AS ABOVE	November 7, 2001			November 7, 2001		

NATIONAL IMPLEMENTING DOCUMENT: None. The STANAG will stand alone as the implementing document

RESERVATIONS: None

COMMENTS: See attached DA Form 4797-R.

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U.S. Key Delegate
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1 encl. as stated

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Comments to STANAG 4325E2

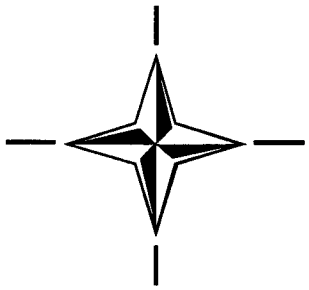
NO (a)	NATION (b)	PAGE (c)	PARA (d)	LINE (e)	COMMENT(S) (f)	REASON(S) (g)
1	U.S.	Annex B			**COMMENT:** Consideration be given to adding a requirement for Air drop delivery as a separate test in Appendix B.	It is missing from the list of test and is considered to be an integral test in safety and suitability for service assessment.
2	U.S.	B-3	8.3	2	**COMMENT:** Change to read: "and STANAG 4327(AOP-25)."	Correct reference.
3	U.S.	B-9	26.3	2	**COMMENT:** Cahnge to read " STANAG 4370 (AECTP 400)."	Correct reference.

REVERSE OF DA FORM 4797-R, DEC 88

Encl 1

STANAG 4325
(Edition 2)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)



NATO STANDARDIZATION AGENCY
(NSA)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: AIR-LAUNCHED MUNITIONS SAFETY AND SUITABILITY FOR SERVICE EVALUATION

Promulgated on 22 August 2002

Jan H ERIKSEN
Rear Admiral, NONA
Director, NSA

STANAG 4325
(Edition 2)

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director, NSA under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "In NATO Standardization, the fulfilment by which a member nation formally accepts, with or without reservation, the content of a Standardization Agreement" (AAP-6).

5. Implementation is "In NATO Standardization, the fulfilment by a member nation of its obligations as specified in a Standardization Agreement" (AAP-6).

6. Reservation is "In NATO Standardization, the stated qualification by a member nation that describes the part of a Standardization Agreement that it will not implement or will implement only with limitations" (AAP-6).

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page (iii) gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page (iv) (and subsequent) gives details of reservations and proprietary rights that have been stated.

FEEDBACK

8. Any comments concerning this publication should be directed to NATO/NSA - Bvd Leopold III, 1110 Brussels - BE.

STANAG 4325
(Edition 2)

NAVY/ARMY/AIR

NATO STANDARDIZATION AGREEMENT
(STANAG)

AIR-LAUNCHED MUNITIONS SAFETY AND SUITABILITY FOR SERVICE EVALUATION

Annexes:

A. Basic Safety Tests.
B. Supplementary Safety and Environmental Tests.

Related Documents:

AAP-6	NATO Glossary of Terms and Definitions.
AECTP-300	Climatic Environmental Tests.
AECTP-400	Mechanical Environmental Tests.
AOP-15	Guidance on the Assessment of the Safety and Suitability for Service of Non-nuclear Munitions for NATO Armed Forces.
AOP-24	Electrostatic Discharge, Munition Assessment and Test Procedures.
AOP-25	Lightning, Munition Assessment and Test Procedures.
AOP-39	Guidance on the Development, Assessment and Testing of Insensitive Munition (MURAT).
STANAG 2895	Extreme Climatic Conditions and Derived Conditions for use in Defining Design/Test Criteria for NATO Forces' Materiel.
STANAG 4147	Chemical Compatibility of Ammunition Components, Explosives and Propellants (Non-Nuclear Applications).
STANAG 4157	Fuzing Systems-Test Requirements for Assessment for Safety and Suitability for Service.
STANAG 4170	Principles and Methodology for the Qualification of Explosive Materials for Military Use.
STANAG 4234	Electromagnetic Radiation (200 kHz to 40 GHz) Affecting the Design of Materiel for use by NATO Forces.
STANAG 4235	Electrostatic Environment Conditions Affecting the Design of Materiel for use by NATO Forces.
STANAG 4236	Lightning Environmental Conditions Affecting the Design of Materiel for use by NATO Forces.
STANAG 4239	Electrostatic Discharge - Munition Test Procedures - AOP-24.
STANAG 4240	Liquid Fuel Fire Tests for Munitions.
STANAG 4241	Bullet Attack Test for Munitions.
STANAG 4324	Electromagnetic Radiation (Radio Frequency) Test Information to Determine the Safety and Suitability for Service of Electro-Explosive Devices and Associated Electronic systems in Munition and Weapon Systems.
STANAG 4327	Lightning Munitions Assessment and Test Procedures – AOP-25.

STANAG 4325
(Edition 2)

STANAG 4370	Environmental Testing (covering AECTPs 100-500).
STANAG 4375	Safety Drop - Munitions Test Procedure.
STANAG 4382	Slow Heating Test for Munitions.
STANAG 4396	Sympathetic Reaction - Munition Test Procedures.
STANAG 4416	Nuclear Electromagnetic Pulse - Munition Test Procedures.
STANAG 4439	Policy for the Introduction, Assessment and Testing of Insensitive Munitions (MURAT).
STANAG 4518	Safe Disposal of Munitions - Design Principles and Requirements and Safety Assessment.

AIM

1. The aim of this agreement is to standardize the environmental and safety testing applied to an Air-Launched Munition (ALM), to support the appraisal of their safety and suitability for service in accordance with AOP-15, and to avoid unnecessary duplication of testing.

AGREEMENT

2. Participating nations agree that environmental and safety testing (including adequate documentation), performed in accordance with this STANAG, is valid for evaluation. Further, they agree that the results of environmental and safety tests of ALM performed in accordance with this document will be provided by the developing nation to participating nations upon a valid request.

DEFINITION

3. For the purpose of this document an ALM is defined as any device containing explosive or pyrotechnic materials, with the exception of aircraft gun ammunition, which is launched or released from an aircraft, and which is designed to do damage to, or simulate damage to, the enemy.

GENERAL

4. The purpose of safety and suitability for service evaluation of an ALM is to provide evidence that:

4.1 The explosive components within an ALM shall remain safe and suitable for service under all service normal environmental conditions.

4.2 The risk of an unplanned explosive event occurring during a credible accident or otherwise-survivable enemy action, or during the processes of disposal following such an accident or enemy action, shall be acceptably low. (Levels of risk are described in AOP-15)

4.3 The ALM shall remain safe and suitable for service, within acceptable performance limits, after being exposed to severe handling and accelerated life testing comparable with those which may be found during transport and storage and when an ALM is used in the operational launch aircraft environment.

4.4 There shall be no damaging interaction between ALM explosive components and/or the complete ALM and/or its packaging when subjected to service environmental conditions.

DETAILS OF THE AGREEMENT

5. Procedure

5.1 Each nation will be responsible for the safety and suitability for service evaluation of an ALM to be used by its own services and for this purpose will, as defined in AOP-15, require copies of the design characteristics, safety analyses, and trials reports from the nation responsible for the development of the ALM being evaluated. The nations carrying out the safety and suitability for service evaluation tests on a particular ALM agree to make their test parameters, safety analyses and trials reports available to other NATO nations upon justifiable request.

5.2 Notwithstanding the intention to avoid duplication of testing, each nation reserves the right to carry out additional testing if considered necessary and, when necessary, to bear the financial, technical and safety consequences of conducting the tests. The arrangement should exist whereby the nation requiring the additional tests can obtain assistance, under conditions to be negotiated, from the developing nation.

5.3 Any significant proposed changes to the agreed assessment procedures shall be provided by the developing nation to the user nations for comment and concurrence. Any changes made without the mutual acceptance of the ratifying nations may negate the acceptability to the user nations of the assessment procedures that are applied.

5.4 There are some inherently different environmental hazards and operational philosophies between different types of ALM which affect safety evaluations. A specific test programme, therefore, with the exception of the Basic Safety Tests outlined at Annex A, need not include all, or be limited to, tests described in this document. The selection of supplementary tests and their test parameters should be based on the measured or analytically forecast life cycle environmental profile of the test item.

5.5 No individual test or group of tests can be assessed in isolation and it is agreed that the final assessment recommendation takes account of development trials, as well as individual national evaluation procedures, in order to make a valid assessment of the ALM in its expected service life environment.

6. Safety Testing of Explosives. The basic safety characteristics of the explosives of an ALM shall be established in accordance with STANAG 4170 and national requirements, where those national requirements are more severe. The compatibility of all materials shall be assessed in accordance with STANAG 4147.

7. Safety Testing of Fuzing Systems. The basic safety characteristics of fuzes of an ALM shall be established in accordance with STANAG 4157.

8. Vulnerability. The vulnerability and sensitivity of an ALM to an unplanned stimuli and the violence of any explosive response shall be minimised. The ALM shall be designed to meet the criteria for Insensitive Munitions in STANAG 4439.

9. Life Cycle Events and Service Environment. In accordance with AOP 15, the Life Cycle Events and Service Environment for the ALM shall be determined. The tests required to establish the safety and suitability for service characteristics of the ALM shall take account of the requirement to demonstrate the required storage and operational life of the ALM, the requirements will normally be defined in the Operational Requirement.

10. Disposal. To ensure safe disposal of the ALM, the munition shall be designed in accordance with STANAG 4518.

11. Environments. Environments which shall be considered for the assessment and testing of an ALM should be determined using the questionnaire at Annex A to AOP-15, and are summarised as:

11.1 Natural environments created regardless of human intervention, eg. temperature, pressure, humidity, lightning.

11.2 Induced environments associated with the handling and transportation of an ALM from manufacture, through storage and maintenance, up to and including loading onto launch aircraft.

11.3 Induced environments associated with carriage on the launch aircraft (including operation from ships' decks), and with launch and free-flight of the ALM.

11.4 Induced electromagnetic, electrostatic and nuclear environments resulting from human intervention.

11.5 Hazardous environments associated with enemy action and accidents, such as jettison, accidental release, aircraft crash, fire, strike by ordnance, and transportation accidents.

12. Environmental Specification To ensure that the environments used during tests are appropriate, the anticipated environment scenario shall be detailed so that it is consistent with the operational requirement for ALM. Certification that the anticipated environment scenario has been correctly defined should be given by the appropriate Operational Requirements office of the developing nation's service or services. This process is defined in AOP-15.

13. Outline of the Environmental and Safety Test Programme. An environmental and safety test programme shall be developed for the ALM, based on the environmental factors contained in paras 9 to 12 above, to satisfy the requirements of national/service safety evaluation organisations. Such a programme should conform with relevant STANAGs, in particular STANAG 4370 and its related AECTPs. This range of test procedures will include both Basic Safety Tests and supplementary tests, and the construction of the test programme should include the sequencing of tests on the items provided for such a programme. The selection of tests, test methods, test parameters and test durations, and the arrangement of test sequences shall be agreed with the Project Manager or his delegated representative; the logic of these choices related to the specified environment shall be documented.

14. Basic and Supplementary Tests. The Basic Safety Tests are mandatory and must be conducted satisfactorily to establish adequate safety in accident situations; these tests are given at Annex A. The Basic Safety Tests will not be, in themselves, sufficient to assess the safety and suitability for service of an ALM. Supplementary tests, chosen from Annex B or national procedures, are an additional range of tests which shall be conducted to support of the safety and suitability for service evaluation. They may be used both to condition a munition for the Basic Safety Tests, and to provide information on the ability of the ALM to remain safe and suitable for service in a given environment. All supplementary tests from Annex B shall be considered when developing an environmental and safety test programme for an ALM.

15. Pass Criteria. The pass criteria for the Basic Safety Tests are addressed at Annex A. The criterion for successful completion of those tests at Annex B included in an environmental and safety programme shall normally be that the explosive components and explosive associated components of the ALM subject to test should remain in a safe and suitable for service condition. Exceptionally, a degradation in suitability for service/performance may be permitted but safety must not be impaired.

16. Test Procedures. The tests described in Annexes A and B shall be conducted in accordance with recognised procedures. Individual ratified test STANAGs, including any that may be written in the future, shall be used in preference to other national procedures.

17. Choice of Tests and Sequencing. Implicit in the definition of supplementary tests is the assumption that some or all of the environmental and safety test programme will be conducted sequentially on the ALM provided for test. Since such sequences will normally end with destructive functioning, destructive safety tests or destructive detailed examination, the detailed design of the ALM shall be critically examined so that the sequence or sequences represent the best compromise between a realistic manufacture-to-target or disposal sequence of environments, and those sequences which cumulatively produce the worst degradation of the items under test. The content of test sequences and the number of items involved will be influenced by the similarities with previous designs or conversely by the technical innovation of the design and the confidence level required. The content and extent of a test programme for the ALM will be further influenced by the confidence gained from component or assembly test programmes in relation to the overall design of the munition.

18. Additional Tests. Any tests not included in Annex B which are considered necessary by a developing authority to simulate a specific environment, are expected to be conducted to satisfactorily simulate the effects of that environment. Further confidence in the safety and suitability of all munitions can be gained by in-service surveillance.

19. Relationship with Development Testing. Tests on an ALM shall be classified as either development or environmental/safety tests. It is expected that the spectrum of tests outlined in Annexes A and B will be included in both development and environmental/safety test programmes, but development programmes may include other tests. The essential differences between the two programmes are that the test items for the environmental/safety test programmes shall be representative of production standards, and that they shall successfully pass the environmental/safety test programme.

20. Development and Environmental/Safety Test Reporting. To ensure that adequate data are available to national/service safety evaluation organisations for the assessment of ALM systems for safety and suitability for service, nations developing the ALM system shall compile a data package which documents the test methods and programme selection rationale, and provides detailed results obtained during development and environmental/safety tests. This data package should be supplemented by a technical design data package.

21. Testing of Explosive Assemblies and Sub-Assemblies. During the manufacture-to-target or disposal sequence for an ALM, individual explosive assemblies and/or sub-assemblies, either packaged or unpackaged, may be subject to storage, handling, testing, and transportation by road, rail, sea or air. This may arise through the design concept for the ALM, through the provision of spare parts or during disposal. Furthermore, environmental and safety testing of explosive assemblies and/or sub-assemblies can provide the necessary confidence to enable economies to be made in the testing of the ALM in accordance with this STANAG. Therefore, while this STANAG does not apply directly to the testing of explosive assemblies or sub-assemblies, the overall safety and suitability for service assessment of an ALM will take account of such testing.

IMPLEMENTATION OF THE AGREEMENT

22. This STANAG is considered implemented by a nation when that nation has issued instructions that all future relevant ALM equipment procured for its forces will be tested in accordance with the procedures in this agreement.

ANNEX A to
STANAG 4325
(Edition 2)

BASIC SAFETY TESTS

INTRODUCTION

Development tests in line with those detailed in this Annex, should be conducted at an early stage in the development of the major explosive components for an ALM in order to establish the likely reaction of those components to these hazards. The results of such development tests will determine any need for design changes to improve safety, and it will also give an indication at an early stage of the likely results of conducting full-scale tests on a complete ALM. It will be necessary to demonstrate by tests as defined below that the ALM does not infringe the stated acceptance criteria when produced and assembled to the intended production standard. The rationale for concluding that sufficient satisfactory test evidence has been gathered shall be agreed by the Project Manager or his delegated representative.

1. 12 METRE SAFETY DROP

1.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe for disposal following a large accidental drop.

1.2 Information. The munition, normally in its logistic packaging, will be dropped onto an impacting surface of concrete, faced with a steel plate, so that the base of the packaged munition impacts in the horizontal attitude. Prior to this test, stores may be subjected to typical environmental tests (eg thermal cycling, humidity, vibration, shock) to simulate service use if assessment of the design indicates that such use may cause deterioration liable to adversely effect the outcome of the test. Under certain circumstances, this test may be applied to unpackaged stores if study of the in-service logistics indicates that such a risk exists. Furthermore, study of the in-service logistics of the munition may indicate that the height of drop, either packaged or unpackaged, should be greater than 12 metres.

1.3 Test Procedure. The test should be conducted in accordance with STANAG 4375.

2. LIQUID FUEL FIRE

2.1 Reason for Test. The test is conducted to determine the reaction, if any, of the munition to an intense liquid fuel fire.

2.2 Information. Under most circumstances, the ALM specification will require that the munition does not have a reaction more severe than a Type V Reaction (see AOP-39) however under certain circumstances, it may be sufficient to establish the time at which such a reaction occurs.

2.3 Test Procedure. The tests shall be conducted in accordance with STANAG 4240.

3. SLOW COOK-OFF

3.1 Reason for Test. The test is conducted to determine the reaction of the munition to slowly increasing temperatures such as may result from a fire in an adjacent building or compartment.

3.2 Information. The temperature of the munition should be gradually raised and the reaction noted. The ALM specification should require that the munition does not have a reaction more severe than a Type V Reaction (see AOP-39).

3.3 Test Procedure. Tests should be conducted in accordance with STANAG 4382.

4. BULLET ATTACK

4.1 Reason for Test. The test is conducted to determine the reaction of the munition to being struck by small calibre ammunition.

4.2 Information. Under most circumstances, the ALM specification should require that the munition does not have a reaction more severe than Type V (see AOP-39),or become propulsive when struck by the specified ammunition; any residue should remain safe for disposal. Prior to this test, the munition may be subjected to typical environmental testing (eg. diurnal cycling, humidity, vibration, shock) to simulate service use.

4.3 Test Procedure. The test should be conducted in accordance with STANAG 4241.

5. SYMPATHETIC REACTION

5.1 Reason for Test. The test or assessment is conducted to determine the reaction of the munition, if any, to detonation of a similar munition in close proximity.

5.2 Information. Sympathetic reaction between munitions in all manufacture-to-target or disposal configurations whether packaged, unpackaged, in or out of storage etc. should not be more severe than a Type III Reaction (see AOP-39). Tests which may contribute additional information include Total Fragment Recovery Tests, Fragment Attack Tests and tests performed to establish the hazard classification of the ALM.

5.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4396.

SUPPLEMENTARY SAFETY AND ENVIRONMENTAL TESTS

1. VIBRATION - TRANSPORTATION

1.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following vibrational stresses induced during transportation by sea, road, rail and air.

1.2 Information. The real environment is a mixture of random and sine discrete vibration. Dominant in transportation by ship is sinusoidal vibration at a series of low frequencies whereas random vibration is more significant in road and rail transport. Air transportation vibration is generally random in nature but may have large peak sine discrete vibration superimposed particularly in propeller driven aircraft. Therefore, the type or types of vibration testing selected must be chosen to represent the principal transportation modes specified. Moreover, it may be appropriate to carry out the selected vibration tests at appropriate high and/or low temperatures associated with transportation modes. The effects of vibration upon the ALM may affect the outcome of subsequent tests on the same munition and therefore the sequencing of this test must be considered carefully.

1.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

2. VIBRATION - CARRIAGE

2.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following vibrational stresses induced during carriage on the launch aircraft.

2.2 Information. The vibration environment of external or internal carriage on fixed-wing aircraft is essentially random in nature. The vibration environment of external carriage on rotorcraft is random with superimposed sine discrete vibration associated with the rotor frequencies. The particular vibration produced by the firing of guns from the aircraft should be considered. Furthermore, consideration should be given to conducting this test at the high or low temperature limits of carriage and to including the effect of low air pressures associated with carriage at high altitude.

2.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

3. VIBRATION - FREE FLIGHT

3.1 Reason for Test. The test is conducted to demonstrate that the munition will function as designed during the vibration environment of free flight.

3.2 Information. The duration of the environment is usually very short compared with that of air carriage (Supplementary Test Ser No 2) and may be less severe. However, the munition is expected to function in this environment; in particular, the function of arming the warhead safely, and subsequently detonating it correctly at the correct point in the trajectory of the munition, must occur. Consideration should be given to conducting such tests at the high or low temperature limits associated with launch conditions and the pressure associated with launch from high altitude.

3.3 Test Procedure. Tests should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects. The parameters of tests should, where possible, be based on in-flight measured data

4. SHOCK - NON-REPETITIVE

4.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following non-repetitive shock loadings expected during transportation, handling and use.

4.2 Information. The severity, shape, direction and duration of shock test pulses will depend on the loading being simulated. Such shocks may arise from transportation or handling impacts, or may arise by design during use (e.g. rocket motor ignition, parachute deployment). The effects of shock loadings on an ALM may affect the outcome of subsequent tests on the same munition and therefore the sequencing of this test must be considered carefully.

4.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

5. SHOCK - REPETITIVE

5.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following repetitive shock loadings expected during transportation or handling.

5.2 Information. The severity, shape, direction, duration, frequency and number of shock test pulses will depend upon the situation being simulated. Such repetitive shocks may arise from, for example, transportation by rail or handling by roller conveyor systems. The effects of shock loadings on an ALM may affect the outcome of subsequent tests on the same munition and therefore the sequencing of this test must be considered carefully.

5.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

6. SHOCK - UNDERWATER EXPLOSION

6.1 Reason for Test. The test is conducted to demonstrate that the munition, when embarked in a vessel, will remain safe and suitable for service, or will remain safe for disposal, when the vessel is subjected to the shock of underwater explosions.

6.2 Information. The shock level will vary according to the class of ship and the location of magazines and mountings. There are 2 levels of severity of test.

(1) Vessel Survival Safety. This is the more severe test level, set at the maximum underwater shock that the vessel can safely survive. This is used to determine that the ammunition remains safe for handling and disposal.

(2) Ammunition Survival for Service Use. This is the level of underwater shock at which the ammunition must survive and remain safe and suitable for service use. This test is to be conducted as part of the sequential trial.

6.3 Test Procedure. Tests should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

7. ACCELERATION

7.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe, or remain safe and suitable for service, following accelerations associated with accidents or use.

7.2 Information. Accelerations associated with accidents following which the munition should remain safe include road and rail collisions and survivable aircraft crashes. Accelerations associated with the use of the ALM following which the munition should remain safe and suitable for service include operational aircraft carriage and, for missiles, launch and flight. For cases in which the munition should remain safe and suitable for service, consideration should be given to conducting the tests at appropriate high or low temperatures.

7.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

8. ELECTROMAGNETIC ENVIRONMENTS

8.1 Reason for Test. Tests and assessments are conducted to demonstrate that the munition remains safe, or will remain safe and suitable for service, following exposure to electromagnetic environments defined in STANAGS 4234, 4235 and 4236.

8.2 Information. Electromagnetic environments in which the munition will be expected to remain safe and suitable for service include specified levels of externally and internally generated radiation, externally and internally generated magnetic fields, externally and internally generated electric fields, and electrostatic discharges. Additionally, the environmental values tabulated in the STANAGs at Paragraph 8.1 may need to be increased to account for any specific ALM individual requirements, and to take account of the effects of a lightening strike. As a minimum the munition shall remain safe.

8.3 Test Procedure. Tests should be conducted in accordance with STANAGS 4324, 4239 (AOP-24) and STANAG 4327 (AOP-25).

9. HIGH TEMPERATURE CYCLING

9.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to cycles of high temperature. The test may also be used to represent accelerated ageing.

9.2 Information. The test cycles to be used will normally be selected from those specified in STANAG 2895. Each cycle will represent a 24 hour period. The cycles may be conducted with low humidity conditions, with controlled high humidity conditions, or with the effects of high solar radiation superimposed. Such cycles may be used to represent accelerated ageing where an assessment of the munition design indicates that high temperature cycling will cause deterioration. The selection of the cycles to be used, and the number of cycles to be applied, will depend upon assessment of the in-service logistics of the munition and the amount of accelerated ageing to be represented. Tests using high humidity conditions should be programmed to follow some vibration and/or shock testing; other tests in the group may be placed as judged most appropriate or convenient from a study of the manufacture-to-target or disposal sequence, but in general are best placed early in a long test sequence. Account should be taken of any environmental protection (e.g. by container design) provided for the munition.

9.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

10. LOW TEMPERATURE CYCLING

10.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to cycles of low temperature.

10.2 Information. The test cycles to be used will normally be selected from those specified in STANAG 2895. Each cycle will represent a 24 hour period. Such cycles may be used to induce thermo-mechanical stressing where an assessment of the munition design indicates that low temperature cycling is likely to cause such stressing. The selection of the cycles to be used, and the number of cycles to be applied, will depend upon assessment of the in-service logistics of the munition and the amount of thermo-mechanical stressing to be induced. For advice on the sequencing of the test, see Paragraph 9.2 Account should be taken of any environmental protection (e.g. by container design) provided for the munition.

10.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

11. CONSTANT HIGH TEMPERATURE

11.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to constant high temperature.

11.2 Information. Provided sufficient testing of the munition to Supplementary Test Serial No 9 is conducted , this test should not be necessary for an ALM since it is not a natural environment to which such stores are normally subjected. If sufficient testing to Supplementary Test Ser No 9 is not conducted, or is not possible, then constant high temperature testing at the limit temperature of the appropriate cycle specified in STANAG 2895 may be conducted. For advice on the sequencing of the test, see Paragraph 9.2 Account should be taken of any environmental protection (e.g. by container design) provided for the munition.

11.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

12. CONSTANT LOW TEMPERATURE

12.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to constant low temperature.

12.2 Information. Although low temperature cycling (Supplementary Test Ser No 10) is preferred, this test may be adequate to demonstrate survival of the cold temperature environment. If this test is selected, the limit temperature of the appropriate cycle specified in STANAG 2895 should be used. For advice on the sequencing of the test, see Test Ser No 9. Account should be taken of any environmental protection (e.g. by container design) provided for the munition.

12.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

13. DRIVING RAIN

13.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to driving rain.

13.2 Information. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after mechanical and climatic (hot/cold) testing. The parameters of the test are defined by rainfall intensity, duration and angle of spray. Consideration may also be given within the test to represent air carriage and the free flight phase of the munition through heavy rain.

13.3 Test Procedure. Tests should be conducted in accordance with STANAG 4370, AECTP-300.

14. CORROSION - SALT ATMOSPHERE

14.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to a salt atmosphere.

14.2 Information. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after mechanical and climatic (hot/cold) testing The severity of the test is determined by the spraying time, the subsequent storage conditions (temperature and humidity) and duration, and the number of complete cycles.

14.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

15. MOULD GROWTH

15.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to typical mould cultures.

15.2 Information. In the design of the munition, materials should be chosen which have been demonstrated to be mould growth resistant. It should be noted however that the combination of such materials may still support the growth of mould. This test should not be placed in a sequence which includes Supplementary Tests Serial Numbers 14, 15 or 16, and otherwise should be the final test in a sequence.

15.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

16. DUST AND SAND

16.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to blowing dust and sand.

16.2 Information. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after mechanical and climatic (hot/cold) testing. The test severity is determined by the particle size and concentration, the air velocity and the test duration.

16.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

17. FLUID CONTAMINATION

17.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to contaminating fluids typical of those which may be encountered in service.

17.2 Information. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after mechanical and climatic (hot/cold) testing. The range of fluids which should be considered include appropriate fuels, oils, hydraulic fluids, solvents, cleaning fluids, battery electrolytes and nuclear fall-out decontamination fluids. The extent of the effects of contamination is related to the temperature and duration of storage after application of the fluid(s). The fluids to be used and the severity parameters should be determined from a study of the manufacture-to-target or disposal sequence for the munition. Consideration should also be given to the need to pre-heat the fluid(s) to appropriate temperatures.

17.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

18. ACOUSTIC NOISE

18.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to high levels of acoustic noise.

18.2 Information. High levels of acoustic noise are generally associated with jet engine exhausts or firing rocket motors. The test severity is defined by the overall sound pressure level (OSPL) and the duration of exposure; in addition, the frequency band width of the noise should be specified. Consideration should also be given to the need to conduct the test at high or low temperatures. Testing should not normally be required where the predicted OSPL exposure is less than 130 dB.

18.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

19. RAPID DECOMPRESSION

19.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe, or remain safe and suitable for service, following exposure to rapid decompression .

19.2 Information. The test is concerned with the rapid fall in air pressure associated with loss of pressurisation in transport aircraft. Therefore, study of the in-service logistics of the munition will determine whether or not the munition should be packaged for this test. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after mechanical and climatic (hot/cold) testing. Consideration should be given to the need for the test to be conducted at low temperature.

19.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

20. RAPID PRESSURE CHANGE

20.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to the rapid pressures changes experienced during carriage on high performance aircraft or during ALM free-flight.

20.2 Information. Assessment of the use of the ALM should provide the pressure changes and rates required to be tested; increasing and decreasing pressure tests may be appropriate. Consideration should be given to conducting tests at high or low temperatures.

20.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

21. LOW PRESSURE

21.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to constant low pressure.

21.2 Information. Tests can represent either air transport with reduced cabin pressure or air carriage at high altitudes. A study of the manufacture-to-target or disposal sequence for the munition will determine the parameters (pressure levels, rates of change and duration) including the packaged state appropriate for any test. Consideration should be given to the need to conduct tests at low temperatures and with high humidity during which icing may occur.

21.3 The Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

22. THERMAL SHOCK

22.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to large and rapid increasing or decreasing temperature changes.

22.2 Information. Situations represented by this test include storage, handling, transportation and use sequences; typical is removal from temperature conditioned storage into an extreme low temperature ground environment. Study of the manufacture-to-target or disposal sequence for the munition will determine the parameters (temperature soak conditions, rates of change and durations) including the packaged state appropriate for any test.

22.3 Test Procedure. Tests should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

23. AERODYNAMIC HEATING

23.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service during and after the heating effect associated with high speed air carriage.

23.2 Information. The parameters of the test are the starting soak temperature, the aerodynamic heating skin temperature and the duration of exposure. These parameters should be determined from a study of the manufacture-to-target or disposal sequence for the munition and the performance characteristics of the carrying aircraft. Consideration should be given to both high and low temperature start conditions.

23.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

24. NUCLEAR HARDENING

24.1 Reason for Test. Tests or assessments are conducted to demonstrate that the munition will remain safe, or remain safe and suitable for service, following exposure to the effects of a nuclear explosion.

24.2 Information. The potentially damaging effects of a nuclear explosion are electromagnetic pulse (EMP), nuclear radiation, air blast and thermal radiation. Consideration should be given to severity levels of these effects at which the ALM should remain safe, and severity levels at which the ALM should remain safe and suitable for service. Generally, it will be acceptable to conduct such tests singly and not as part of a sequence.

24.3 Test Procedure. For EMP the test should be conducted in accordance with an appropriate test in STANAG 4416. For tests on effects other than EMP, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

25. HORIZONTAL IMPACT

25.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following horizontal impacts likely to arise during transportation or handling operations such as movement by crane or under slung from a helicopter.

25.2 Information. For this test, the munition should be packaged since it represents a simulation of impacts during transportation or handling which may damage the packaging but from which the ALM should be protected. Subject to satisfying the manufacture-to-target or disposal sequence, this test is preferably performed after vibration, shock and climatic (hot/cold) testing.

25.3 Test Procedure. The test should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

26. FREE FALL

26.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe, or remain safe and suitable for service, following free fall drops.

26.2 Information. A study of the manufacture-to-target or disposal sequence for the munition should determine the heights from which tests should be conducted, whether or not the munition should be packaged for each height selected, and whether the munition should be required to remain safe for disposal, or remain safe and suitable for service, following each drop test serial. (See also Basic Safety Test Ser No 1). The selected criteria for a particular free fall test of a particular ALM will determine whether or not it should be the end-point test of a sequence but, generally, free fall tests should be preceded by vibration, shock and climatic (hot/cold) testing.

26.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG 4370, (AECTP 400).

27. LIFTING

27.1 Reason for Test. The test is conducted to demonstrate that the packaged munition will remain safe and suitable for service following lifting operations associated with handling and transportation.

27.2 Information. A study of the proposed packaging design and the in-service logistics of the munition should determine the types of lifting operation to be simulated. Since the test is essentially concerned with the adequacy of the packaging, inert stores may be used unless there is serious doubt as to the protection provided.

27.3 Test Procedure. The test should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

28. STACKING

28.1 Reason for Test. The test is conducted to demonstrate that the packaged munition will remain safe and suitable for service following stacking operations and storage.

28.2 Information. The test examines the capability of the package to protect the munition during stacking and when stacked in accordance with the requirements of the in-service logistics for the munition. Since the test is essentially concerned with the adequacy of the packaging, inert stores may be used unless there is serious doubt as to the protection provided.

28.3 Test Procedure. The test should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-400.

29. BLAST EFFECTS

29.1 Reason for Test. The test or assessment is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to the blast effects from the launch of adjacent missiles or the firing of adjacent guns.

29.2 Information. The munition should remain safe and suitable for service when subjected to the shock and vibration loads caused by the launch or firing of adjacent missiles or guns.

29.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

30. CATAPULT/ARRESTED LANDING

30.1 Reason for Test. The test or assessment is conducted to demonstrate that the munition, when fitted to the carrying aircraft, will remain safe and suitable for service following the loads associated with catapult take-offs from, and arrested landings on, naval aircraft carriers and airfield barrier/arrestor gear engagements.

30.2 Information. Tests which contribute information for an assessment include Supplementary Tests Ser No 4 and 7; however, specific tests may be necessary particularly where aircraft rotational loads are assessed as high.

30.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

31. FLOODING

31.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe following exposure to flooding by sea water aboard naval vessels.

31.2 Information. Water activated devices should remain safe when subjected to flooding other than in the intended mode of use. All munitions, which are not designed to be watertight, should remain safe but not necessarily serviceable.

31.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

32. LEAKAGE WHEN IMMERSED

32.1 Reason for Test. The test is conducted to demonstrate that the munition, if designed to be watertight, will remain safe and suitable for service following immersion in water.

32.2 Information. Failure of seals, corrosion and improper assembly are major factors to consider when setting up this test.

32.3 Test Procedure. The test should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

33. HAIL

33.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to hail during air carriage or free flight.

33.2 Information. The forward facing surfaces of the munition are those most likely to be affected by hail impact and a study of the munition design should ascertain this. It is likely that the test can be conducted on the components assessed to be at risk, or on samples of the materials from which those components are made.

33.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

34. ICING

34.1 Reason for Test. The test is conducted to demonstrate that the munition will remain safe and suitable for service following exposure to icing conditions during air carriage.

34.2 Information. The formation of ice has been known to cause the arming systems of air-launched munitions to malfunction. In addition, the build-up of ice can change the weight and balance characteristics of a munition and thereby affect its aerodynamic behaviour. Consequently, icing can prevent a safe separation of the munition from the launch aircraft being achieved. Flight control surfaces should be functional during this test.

34.3 Test Procedure. The test should be conducted in accordance with an appropriate test in STANAG 4370, AECTP-300.

35. TOXICITY

35.1 Reason for Test. The test is conducted to demonstrate that the munition will not produce any toxic materials during its normal life cycle.

35.2 Information. This test is often performed at the component level. Materials used in the weapon must not generate toxic materials within the specified climatic operating limits of the weapon.

35.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

36. SAFE SEPARATION

36.1 Reason for Test. The test or assessment is conducted to demonstrate that the ALM separates safely from each specified type of launch aircraft when fired or released operationally.

36.2 Information. Firing or release trials to demonstrate safe separation from each weapons station and in each load configuration for each type of launch aircraft will normally form part of the programme of air trials conducted to clear the ALM for service use. Correct operation of the Safety and Arming unit is also to be confirmed.

36.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

37. JETTISON

37.1 Reason for Test. The test or assessment is conducted to demonstrate that the ALM can be safely jettisoned in an unarmed state from each specified type of launch aircraft.

37.2. Information. Data contributing to an assessment of safe jettison capability should normally be gathered from firing/release trials to prove the operational functioning of the ALM; in addition, tests conducted under Supplementary Test Ser No 36 should provide further evidence. Separate tests to confirm the inhibiting of the arming function during jettison may be necessary.

37.3 Test Procedure. The test should be conducted in accordance with an appropriate test STANAG when ratified. If none exists, national procedures should be used for unilateral projects or mutually agreed procedures for multilateral projects.

RATIFICATION AND IMPLEMENTATION DETAILS EDITION: 2
STADE DE RATIFICATION ET DE MISE EN APPLICATION

NATION	NATIONAL RATIFICATION REFERENCE DE LA RATIFICATION NATIONALE	NATIONAL IMPLEMENTING DOCUMENT NATIONAL DE MISE EN APPLICATION	IMPLEMENTATION / MISE EN APPLICATION					
			INTENDED DATE OF IMPLEMENTATION/ DATE PREVUE POUR MISE EN APPLICATION			DATE IMPLEMENTATION WAS ACHIEVED/ DATE REELLE DE MISE EN APPLICATION		
			NAVY MER	ARMY TERRE	AIR	NAVY MER	ARMY TERRE	AIR
BE								
CA	2441-4325 (A/DAPM 4-4) of/du 13.06.02	STANAG	08.02	08.02	08.02			
CZ	6/2-37/2001-1419 of/du 28.03.01	Not implementing/ Ne met pas en application						
DA *	FKO MAM3 204.69-S4325 0008170-003 of/du 23.02.01	STANAG	10.02	10.02	10.02			
FR	Décision N° 126997 DGA/INSP of/du 28.05.01	STANAG	06.01	06.01	06.01			
GE	BMVg - Fü S I 6 - Az 03-51-60 of/du 21.03.02	STANAG						
GR								
HU								
IT								
LU								
NL	M 2002001605 of/du 18.04.02	STANAG				07.02	07.02	07.02
NO	NSA - 67/01/FO/HST/ST 4325 of/du 28.09.01	STANAG	12.01	12.01	12.01			
PL								
PO								
SP								
TU								
UK	D/Stan/12/15/4325 of/du 21.12.00	STANAG	07.02	07.02	07.02			
US	Memo OUSD(AT&LT) of/du 07.11.01	STANAG	11.01	11.01	11.01	11.01	11.01	11.01

* See reservations overleaf/voir réserves au verso
+See comments overleaf/Voir commentaires au verso
X Service(s) implementing/Armées mettant en application

STANAG 4325
(Edition 2)

RÉSERVES/RESERVATIONS

DENMARK	Paragraph 8 in STANAG 4325 states, that all-air launched munitions "...shall be designed to meet the criteria for Insensitive Munitions in STANAG 4439". Denmark reserves the right to follow the STANAG 4439 statement that Insensitive Munitions will be implemented" ...whenever it is feasible to do so", taking operational and economic aspects into account.
DANEMARK	*Il est stipulé, dans le paragraphe 8 du STANAG 4325, que toute munition à lanceur aérien "... devra être conçue en conformité aux critères MURAT du STANAG 4439". Le Danemark se réserve le droit de suivre le STANAG 4439 qui dit que les munitions à risques atténués seront mises en service "... chaque fois qu'il sera possible de le faire", compte tenu des aspects opérationnels et économiques*